

Oscillator Representation and Automorphic Forms

These talks will review the foundations of the theory of theta series.

The first topic will be construction of the oscillator representation for symplectic/metaplectic groups over locally compact fields. This was first explicitly done by Andre Weil. We will give an alternate construction, by means of an explicit semigroup of operators whose boundary contains the metaplectic group. This semigroup is intimately related to many basic topics in analysis, and is of interest in its own right. These constructions involve the Heisenberg group and symplectic geometry.

The theory of theta series then involves restricting the oscillator representation to various subgroups of the metaplectic group, of the form $G \times G'$, where G and G' are mutual centralizers inside the metaplectic group. We will describe the possibilities for pairs (G, G') . Essentially classical group can appear as a G in a pair (G, G') .

The restriction of the oscillator representation gives rise to natural correspondences between representations of G and G' , known as *theta correspondences*. The talks will end by describing some of the basic properties of these theta correspondences, and the relation between local and global aspects of the theta correspondence.